

# Heat Exchanger Integrity Test as the cost-effective way to quality assurance

**Preventive maintenance of heat exchangers is often seen as a decision between high spare parts costs and a high risk of quality problems.**

**Bactoforce provides the solution that allows you to reduce preventive maintenance costs without compromising quality and food safety.**

Constantly increasing production capacities, longer production times and higher demands on the part of retailers mean that quality assurance and the avoidance of unplanned production downtimes are becoming ever more important.

Contamination in heat exchangers is a known risk in food production and it is common practice to ensure the integrity of the objects. Especially in the field of heat exchanger testing, it is no longer just about the tightness and integrity of the exchanger plates and modules and their seals. The measurement and classification of organic contamination after CIP cleaning, entrained biofilms or fouling in the non-CIP sections are playing an increasingly important role. Testing technology from Bactoforce and experienced technicians help to make everyday production safer.

In this article we will look at common methods of ensuring heat exchanger integrity. In any strategy, a trade-off must be made between maintenance costs and potential "quality costs" (e.g. downtime, product losses, product recalls, etc.).

*We will argue that conducting inspections is a cost-effective strategy that allows the manufacturing site to control the hygiene risk associated with heat exchangers.*

## Strategies for preventive maintenance of heat exchangers

In accordance with the usual maintenance philosophies for mechanical components, different strategies can be pursued to look after plate heat exchangers.

### Crash

"Our plant is run until damage is visible from the outside (e.g. leakage) or measurable in the product (contamination)". "Crash" refers to the approach where no preventive measures are implemented and only a visible leak or discovered quality problem leads to corrective action.

Although this is a low cost approach in the short term, it is a long-outdated solution that carries high and incalculable risks for the product, the operating process and, of course, the end consumer. Furthermore, damage detected too late can lead to expensive and image-damaging recalls. This is a risk that must be avoided - it is like driving a car when you only look in the rear-view mirror.

### Preventive exchange of plates

With this strategy, the heat exchanger is opened at certain time intervals and the plate packs are replaced with new or refurbished plates.

This strategy ensures the integrity of the heat exchanger, but is also very beneficial for the spare parts supplier. These parts are designed for a long service life and replacement at intervals of e.g. 1 year is therefore not the right solution.

Furthermore, it is also an "all-or-nothing" approach in the sense that since you have no prior knowledge of the actual condition of the parts, you are forced to replace all of them.

It is not the purpose of this article to discuss the impact of using reconditioned plates versus new plates when they need to be replaced. Bactoforce has data from thousands of heat exchanger inspections that give us insight into the average time between defects, but we cannot say whether using reconditioned plates results in shorter intervals (higher risks). Regardless of which type is used, regular inspections will help you make informed decisions about when to replace.

Another experience is that there is a real risk of damage to the panels during installation. This can be mitigated by performing a leakage test in the closed state after tensioning the panel pack.

### **Planned Integrity Inspections**

The safest, most effective and cost-efficient strategy is to carry out planned integrity inspections. This takes into account not only the age and condition of your facilities, but also their tasks and the associated risks.

An inspection plan is drawn up for several years, which specifies exactly when and to what extent each system is to be inspected. The clear advantages lie in the ability to plan the time and the scope of the inspection, which is precisely matched to the requirements of the process and the system.

This strategy allows you to measure and track the integrity of the heat exchanger on a documented basis, so you stay in control. The sensitivity of the inspection method means that even microscopic and non-critical defects can be detected in time before they can lead to quality problems. In principle, it's the same thing you do when you take your car in for an inspection every two years, and using the same analogy, you drive now while looking at the road ahead.

From time to time, defects WILL occur and the panels will need to be replaced. However, with the knowledge from the inspection, you can determine which panels need to be replaced and have the flexibility to replace only those.

Testing the heat exchanger with the Bactoforce method has the added advantage that we are able to validate CIP cleaning by checking for organic residues on the product side and increase energy efficiency by cleaning the energy side of the heat exchanger, thereby reducing fouling.

And all this without opening the heat exchanger.

### **Defect rates based on inspection history**

Bactoforce has carried out thousands of inspections of heat exchangers in the food sector in Northern Europe over the years. We have studied the data from these inspections to bring our experience to light.

In the period from 2017 - 2021, we carried out more than 14,000 heat exchanger inspections at more than 5,500 different properties. From these, we selected those where we carried out inspections at least once a year as part of an inspection plan. This resulted in a number of 639 individual heat exchangers.

We carried out 3,527 inspections on these heat exchangers during this period. In 364 cases we found a leak. That is about 10 %.

These figures lead to the following conclusions:

- 1) If you do not take preventive measures, you run a real risk of cross-contamination from the heat exchanger - every year.
- 2) Replacing all plates of a heat exchanger is too costly in relation to the actual risk.

Inspections are therefore the right preventive measure - at the right cost.

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### **Example from customer**

A case study was carried out using data from a large food manufacturer. The aim was to compare the costs of replacing plates as a preventive measure and carrying out inspections.

The manufacturer replaced the plates annually to ensure the integrity of the heat exchanger. This was important because of the sensitivity of the product.

Considering the sensitivity of the product, Bactoforce proposed to carry out inspections every 6 months and to combine 3 elements in the package: Leak test, organic residue test (product side) and cleaning of the energy side.

By carrying out inspections, Bactoforce has been able to reduce annual costs by 66%. An additional benefit is that the manufacturer now has an overview of the integrity of the plant every 6 months instead of every 12 months.

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### **The Bactoforce Method**

With the aim of measuring and identifying risks in process plants before they cause problems for the product, the producer or the end user, Bactoforce has developed its own patented method and perfected it over several years. Special attention was paid to production-specific requirements in order to be able to offer a practical and effective solution.

As an independent service provider, Bactoforce has no interest in selling spare parts - our interest is solely in providing service to the food manufacturer.

### **Briefly about Bactoforce**

Bactoforce has built up a range of services tailored to the food industry. Thanks to our 25-year market presence, we have an unrivalled wealth of experience and knowledge. Our inspectors operate throughout Europe and travel daily to production sites in their local catchment area. This gives us planning flexibility when our customers' production schedules change. We set standards for quality and safety. Our staff usually have a background in the food industry and are professionally trained to become your specialised service partner.

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